Airborne Geological and Geophysical Mineral Inventory **FY2003 Request: $500,000**
Reference No: 6852

AP/AL: Appropriation
Category: Development
Location: Statewide
Election District: Statewide
Estimated Project Dates: 07/01/2002 - 06/30/2004

Project Type: Planning

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Brief Summary and Statement of Need:
This project seeks to catalyze private-sector mineral development investment. The project delineates mineral zones on Alaska state lands that: 1) have major economic potential; 2) can be developed in the short term to provide high quality jobs for Alaska; and 3) will provide economic diversification to help offset the loss of Prudhoe Bay oil revenue. Mineral resources comprise a major part of Alaska's economic assets, yet the location and magnitude of these resources are largely unknown. Knowledge of the State's mineral resources is a key to orderly development of the state and to the maintenance of a stable economy.

Funding:

	FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	Total
Gen Fund	$500,000	$700,000	$700,000	$700,000	$700,000		$3,300,000
Total:	$500,000	$700,000	$700,000	$700,000	$700,000	$0	$3,300,000

☐ State Match Required ☐ One-Time Project ☐ Phased Project ☒ On-Going Project
0% = Minimum State Match % Required ☐ Amendment ☐ Mental Health Bill

Operating & Maintenance Costs:

	Amount	Staff
Total Operating Impact:	0	0
One-Time Startup Costs:	0	
Additional Estimated Annual O&M:	0	0

Prior Funding History / Additional Information:
See detailed project description for additional information. Prior appropriations:
FY02 $250,000 (SLA01/CH61)
FY01 $250,000
FY00 $400,000
FY99 $500,000
FY98 $500,000
FY97 $600,000
FY96 $600,000
FY95 $600,000
FY94 $750,000
FY93 $450,000

Mineral resources comprise a major part of Alaska's economic assets. The location and magnitude of these resources are largely unknown, yet that knowledge is the key to orderly development of the state and to the maintenance of a stable economy. Experienced mineral exploration managers have characterized Alaska's present state of mineral development as analogous to that of the entire group of states west of the Rocky Mountains in the late 1800s. At that time a few major ore bodies had been found and prospectors had located hundreds of prospects but none of that region's scores of subsequent world-class mines had been discovered. Alaska is like that. We, however, have the opportunity, capital, and technology to expedite discovery if we so choose.

Alaskans cannot efficiently manage or develop assets that are unknown and unquantified. The present lack of geologic knowledge is a formidable impediment to long-range planning for both industry and the state. The lack of knowledge discourages private-sector investment in Alaska, and instead favors capital allocation to other areas of the world where comprehensive assessments exist or are being actively generated. Major mining companies rely on government-supplied exploration scale (1:63,360) geological, geophysical, and geochemical maps to design and implement their programs. They expect at least this level of effort from any government that seriously desires a mineral industry. Alaska is in global competition with every other country, state, and province for investment dollars. Many of those competitors' lands have far less potential than Alaska, are just as remote, have been more explored, or exist in a much less stable political climate than Alaska. These competitors are more successful than Alaska in attracting and sustaining a robust mining industry because of their extensive geologic information base or because of the pace at which they are generating such a base of new information.

Products and applications of a thorough resource information base include:

1. Enhancing community and local government economies and revenue opportunities. Resource development can provide local sources of wages, tax revenue, and royalty income that are necessary for local infrastructure and essential services within communities.
2. Stimulating private-sector exploration and competitive development of Alaska's mineral resources. The present lack of geologic resource knowledge is a formidable impediment to long-range planning for both industry and the state. The lack of resource knowledge discourages private-sector investment in Alaska, and instead favors capital allocation to other areas of the world where comprehensive assessments exist.
3. Developing transportation corridors and infrastructures. Transportation infrastructure development always requires cost justification based on prior knowledge of resource availability including the likelihood of investment payback and geotechnical knowledge that ensures engineering feasibility.
4. Developing long-term decisions on management of state-interest lands. Products from this project allow the state to look beyond the short-term rise and fall of commodity markets in formulating mineral-resource policies and in responding to related issues, such as land trades, corridor development, area plans, etc.

A statutory and Legislatively mandated mission of DGGS is to:

> "Conduct geological and geophysical surveys to determine the potential of Alaskan land for production of metals, minerals, [fuels, and geothermal resources]…" (AS 41.08.020).

A Legislative measure of this mission is to:

"Complete geophysical/geological mineral surveys of 1000 square miles of Alaska land at a target scale of 1 inch = 1 mile" reported by category."

The Airborne Geophysical and Geological Mineral Inventory Project is congruent with this mandate and uses the most effective, practical, and efficient methods that exists for acquiring geologic data.

The Airborne Geophysical and Geological Mineral Inventory Project has been successful in catalyzing private sector investment and job generation at a level that far surpasses the cost of conducting the surveys. Jobs for the Alaskan public are created both as a direct result of the project's execution and as a result of the knowledge generated about Alaska's mineral resources during the project. During execution of the project immediate jobs are created in the private sector; 90% to 95% of a CIP allocation goes to the private sector in the form of geophysical, helicopter, logistical, lodging, analytical, and various small contracts. Jobs are also generated in the private sector from the typical increase in the numbers of exploration dollars spent and in the number of mining claims staked.

The true economic benefits in terms of job generation or revenue for the State from this project are impossible to predict. Although mineral development is a high-risk enterprise, there is a good probability that several of the prospects identified with the help of data generated by this project will become major mines and thus return the amount of the state's data generation

investment a hundred fold. A similar investment in geologic knowledge in 1982 contributed to the ultimate development of the Fort Knox gold mine near Fairbanks. A recent study found that the Fort Knox Mine creates an annual total of $107 million in local purchases including $35 million directly, and creates 312 indirect jobs in the Fairbanks area. About $4.4 million of local property taxes are generated annually by the mine and its employees since 1997, and average residential electricity rates in the Fairbanks area have been reduced by about 7 percent because of economies of scale created by the mine. These economic benefits to Fairbanks and Alaska have been ongoing for the past 5 years and are projected to continue throughout the mine life, currently estimated to extend eight to ten years into the future. Similar economic benefits for Fairbanks and Delta Junction are expected after the development of the Pogo mine on state-interest lands. Revenue projected to be generated from this project for the State will come from mining license taxes, Corporate income taxes, and Local property taxes.

For the past ten years, the Airborne Geophysical and Geological Mineral Inventory Project was funded through CIPs at an average of 0.5 million dollars a year for a total of about $5 million dollars. This is a strategic and effective investment in a program that aids in identifying mineral resources valued at contributing $7,000 million to the state's economy for the years 1994-2000. During the past few years the mineral industry has drastically curtailed exploration in many areas of the world. Mineral exploration expenditures are down 50% worldwide from what was spent 3 years ago. The fact that exploration expenditure in Alaska has dropped less than 30% during the past three years suggests that this program is an effective incentive to the private sector to preferentially explore for Alaska's resources. In addition, part of the exploration investment decrease is a statistical artifact as successful exploration dollars have been moved to the mine development side of the ledger.

In 1993, the total value of the Alaska mineral industry was $506.7 million/year and in 2000, the total value of the Alaska mineral industry was $1,280 million/year. Even though exploration expenditures were down during the year 2000, the value of mining activity in Alaska during 2000 set a record high. It takes years to explore, identify, investigate, permit, and develop mineral resources. Without further exploration and discoveries, the amount of money generated by the mineral industry in the State will significantly decline.

Estimates of the budget needed to run this project are based on past Geophysical and Geological Mineral Inventory Project expenses. An increase is requested this year because of increases in both the geophysical contract cost and helicopter cost for geologic fieldwork. No new positions are created as a result of this project. DGGS will designate a portion of the CIP funds as a state match for federal funds within the federal State Map National Cooperative Geologic Mapping Program. These federal funds are used to support the ground-truth geologic mapping phase of the project, further increasing the amount of money that goes into the public sector in the manner of helicopter contracts and field logistics.

Specific Spending Detail:
Contingent upon funding levels, DGGS proposes to conduct airborne geophysical surveys in FY03 in one or more of the areas in northwestern, southwestern, south-central, and/or central Alaska. Cost of the surveys varies depending on each tract's size, location, and bid responses from geophysical services vendors. In the past, geophysical/geological surveys of single minimal but reasonably sized tracts have required about $400,000 to $500,000 in CIP funds, augmented by Federal Receipts and General Funds from the operating budget. Due to a 50% increase in helicopter costs during the past year, the cost of both the geophysical surveys and the geologic field projects has significantly increased. $700,000 in CIP funds would be required to obtain 1000 square miles of airborne geophysical surveys and sustain the supporting ground-truth geologic mapping of the survey tracts. At the $700,000 level, $525,000 would be allocated for geophysical surveys, and $175,000 for ground-truth geologic mapping. Specific items at the $500,000 level are given below.

71000 Personal Service –		
Two student interns and partial funding for a currently existing project geologist		$21,400
72000 Travel –		
Travel and per diem for geophysical part of project	$ 1,800	
(monitoring geophysical data acquisition, release geophysical data in Anchorage)		
Travel and per diem for geologic field crew		$ 3,200
73000 Contractual –		
Geophysical contract	Approximately	$371,400
(awarded through competitive State RFP process);		
Ground-truth Helicopter contracts		$ 64,300
Field lodging contracts		$ 14,300

Scientific analytical data contracts	$ 11,400
Small contracts (Mining claims compilation, ATV rental, etc.)	$ 2,100
Maintenance on computer software needed for geophysical monitoring, map production, and interpretation	$ 2,200
Miscellaneous (Newspaper ads for RFP and data release, courier, blueline maps, etc)	$ 2,900
74000 Supplies –	
Plotter paper, mylar for maps, misc. field and office supplies	$ 2,900
Helicopter fuel	$ 2,100

At a funding level of $500,000, over 90% of the allocated CIP amount goes to geophysical contractors, helicopter companies, lodge owners, and supplies of field equipment and fuel in Alaska. DGGS will designate a portion of these CIP funds as a state match for federal funds within the federal State Map National Cooperative Geologic Mapping Program, further increasing the amount of money that goes into the public sector in the manner of helicopter contracts and field logistics.

Areas proposed for FY03 include: 1) Council mining area, Seward Peninsula, 2) Fairhaven placer district, Seward Peninsula, 3) Paxson Region, south-central Alaska, 4) Richardson / Black Mountain area, east-central Alaska, and 5) Goodnews Bay area, southwestern Alaska.

Products resulting from these surveys would include:
1. 1:63,360-scale aeromagnetic and airborne-electromagnetic maps
2. 1:63,360-scale bedrock and surficial geologic maps
3. 1:63,360-scale mineral occurrence maps
4. 1:63,360-scale land status map
5. Various other geological, geochemical, and geophysical data compilations.

Area 1: Council mining area, Seward Peninsula

In 1993, DGGS conducted airborne-geophysical and ground-truth geological mineral surveys in the western half of the Nome mining district. The entire eastern half of the Nome district also has high mineral potential but has not been geophysically or geologically inventoried. Our long-term objective is to acquire airborne geophysical and ground-truth geological data for the entire eastern Nome mining district. Because funding is often limited, however, we have subdivided the eastern Nome district into four potential survey tracts: northern Solomon, southern Solomon, Bluff, and Council. The eastern Nome district encompasses the smaller Solomon, Bluff, and Council districts, which have collectively produced 1,019,513 ounces of gold from 1898-1999. The proposed tracts contain a mixture of Native, state, and federal lands.

Area 2: Fairhaven placer district (Candle quadrangle), Seward Peninsula

Rich placer gold deposits were mined on Candle Creek and Inmachuk River almost continuously from 1901 to the present. Historic placer gold production from this district is 348,000 ounces, with no recorded lode gold production. Buried gold-rich channel gravel is found in the vicinity of Mud Creek. Major streams of the area were extensively dredged; but substantial placer gold resources remain unmined in buried drainages in the northern part of district. Gold is probably derived from polymetallic vein lode deposits associated with Cretaceous granitic plutons that cut late Precambrian to early Paleozoic quartz-mica schist and early- to mid-Paleozoic limestone. High potential for mineral resources occurs on State, native, and federal lands in this area.

Area 3: Paxson Region, south-central Alaska

This region lies on the south flank of the Alaska Range, near the intersection of the Richardson and Denali Highways, about 180 miles north of tidewater at Valdez. Most historic prospecting of the area has concentrated on the mineralization associated with porphyry, massive sulfide and skarn occurrences, while recent investigations have concentrated on potential platinum group element resources. The portions of the rocks thought to be particularly favorable for deposits of platinum group elements are believed to lie within this survey area, and are mostly covered by surficial deposits and vegetation. Aeromagnetic surveys were flown of this area in the early 1970's, but we believe that modern, more closely spaced and thus more detailed surveys will provide better control to more accurately determine faulting, mineral phases and alteration critical in defining the geology and locating the different types of mineralization.

Area 4: Richardson / Black Mountain, east-central Alaska

This region covers the southern half of the Big Delta quadrangle, extending from the Richardson District along the Richardson Highway, to Black Mountain located approximately 50 miles east of Delta Junction. The Richardson District contains lode and placer gold deposits that historically produced over 105,000 ounces of gold. The Goodpaster mining district to the east contains numerous small lode and placer gold deposits near Black Mountain, which is located near the newly discovered, high-grade Pogo gold deposit. Teck Resources Inc. and Sumitomo Corporation have announced a 1998 resource calculation at Pogo of 5.21 million ounces of gold with a grade of 0.52 ounces per ton. Native gold at Pogo is hosted in three large, structurally controlled quartz bodies located near a Cretaceous granite. Regional work has identified an 8-mile-long trend of anomalous soil geochemistry extending southeast from the Pogo deposit towards Black Mountain. Currently the private sector is actively exploring for Pogo-style gold deposits throughout the Richardson/Black Mountain area. The geology and potential for mineral lode deposits in the southern Big Delta quadrangle is poorly known because of extensive vegetative cover and lack of detailed mapping. Airborne geophysical surveys would provide a way to map various lithologic units, especially distinguishing between granitic rocks and the various metamorphic units, and to delineate regional structures. By completing an integrated geophysical-geologic mineral inventory program in the Richardson/Black Mountain area, extensions or new zones of Pogo-style gold mineralization may be identified.

Area 5: Goodnews Bay district, southwestern Alaska

Several potential mineral targets are on state, state-selected, and native lands near Goodnews Bay. At least 650,000 troy ounces of platinum-group metals were mined from the placers draining Red Mountain and Susie Mountain between 1927 and the late 1970's. A specific lode source has not yet been found. Previous data suggest that the Susie Mountain complex is much larger at depth than is exposed at the surface. A high resolution geophysical survey may help delineate particular zones within these ultramafic bodies. Potential mineralized zones slightly north of Red Mountain and Susie Mountain include gold-bearing prospects and polymetallic vein systems.

Project Support:
Local communities, Native corporations, private resource industry, Alaska Minerals Commission, Alaska Miners Association, regional borough governments, Department of Commerce and Regional Affairs, and Department of Natural Resources support the project. Three surveys (western Nome District, Nyac, and parts of the Rampart/Manley District) were conducted in cooperation with the Bering Straits Native Corporation and Sitnasuak Village Corporation, Calista Native Corporation and Doyon Native Corporation, respectively. As owners of large tracts of land intermingled with state lands, they contributed various combinations of services, private geoscience data files, and funding to support the surveys. Private resource companies have provided logistical support, as well as access to proprietary data for mineral properties located within the survey areas.

Project Opposition:
None known.

Alternative Approaches Considered to encourage mineral exploration include the following:

1. Sole reliance on satellite or remote sensing imagery. This approach is rejected because of low resolution and because it cannot look beneath extensive ground cover such as tundra, forest, and soil types in Alaska, and also because it does not provide an unambiguous methodology for detecting subsurface mineralization. These techniques have recently been investigated by DGGS on other projects, particularly Engineering Geologic projects, and though useful for many items, do not work well for bedrock mineral exploration in Alaska.
2. Sole reliance on currently available data. Rejected because of general lack and quality of geologic data. Only about 15 percent of Alaska has adequate geological mapping, and almost none of Alaska has detailed geophysical surveys.
3. Sole reliance on ground-based field investigations. Rejected because of protracted time necessary for such an approach (decades) and because it provides no subsurface information. Much more time and expense is needed to produce geologic maps without geophysical data, and the quality of the maps produced without geophysical data, is almost always severely limited.
4. Sole reliance on airborne geophysical methods. Rejected because geophysical anomalies alone cannot be interpreted without geological and geochemical control.
5. An integrated approach, utilizing regional geophysical and geochemical methods that define resource-rich regions, followed by detailed airborne geophysical surveys and ground-based geological/geochemical investigations of high priority areas. This approach allows the inventory to be completed in an acceptable time, to discriminate between barren and resource-prone terranes, to identify specific commodities, and provide a quantified estimate of resource value and location.

Project History:

Started in 1992, the project was originally designed to systematically acquire geophysical, and where necessary, geological data for about 40 million acres of state-owned uplands having high perceived mineral potential. The purpose and goals of this program have not changed. Candidate lands for this project have been identified on the basis of existing geologic knowledge, land ownership, and responses to solicitations for nominations from Alaska's mineral industry and Native regional corporations. To date 5 million acres of state-owned lands have been surveyed.

Table 1 below lists previous appropriations for the Airborne Geophysical and Geological Mineral Inventory program.

Fiscal year	CIP Amount Appropriated
FY93	$450,000
FY94	$750,000
FY95	$600,000
FY96	$600,000
FY97	$600,000
FY98	$500,000
FY99	$500,000
FY00	$400,000
FY01	$250,000
FY02	$250,000

The Geophysical/Geological Mineral Inventory CIP project is designed to coordinate the generation of airborne geophysical data with ground-based geologic surveys. The geophysical data are of limited effectiveness unless good geologic maps are available to guide analysis and interpretation of the geophysics. If existing geologic data are inadequate, the required geological surveys are most effective when they follow generation of the final geophysical maps. Thus, unless good quality 1:63,360-scale geologic maps already exist, at least one additional year of ground-based field studies is needed to complete a project after an area has been surveyed with airborne geophysical sensors.

To date geophysical surveys of some of the highest mineral potential tracts within 16 of the 51 candidate areas have been completed (Table 2). Current ground-truth mapping projects for the geophysical surveys include the Fortymile area, begun in FY00, and the Salcha River-Pogo area, begun in FY02. Both are designed to be three-year projects. Geochemical data, geochronologic data, and preliminary geologic maps were released in FY00 and FY01 for the first two summers' fieldwork in the Fortymile area. Geochemical data and a very preliminary geologic map were produced and released after a brief reconnaissance visit to the Salcha River-Pogo area in FY01. Previously authorized CIP funds are designated to support these geological ground truth activities. Unless additional funds are appropriated to initiate new airborne-geophysical/geological mineral surveys elsewhere, no new high mineral potential tracts will be geophysically surveyed in FY03.

Table 2. Status of work on previous and current geophysical/geological survey areas.

Nome District western core area	494 sq. miles	Airborne geophysical mapping completed Ground-truth geological mapping completed
Nyac District core area	183 sq. miles	Airborne aeromagnetic mapping completed
Circle District core area	338 sq. miles	Airborne geophysical mapping completed Ground-truth geological mapping completed
Valdez Creek District	75 sq. miles	Airborne geophysical mapping completed Partial geological map available
Fairbanks District	626 sq. miles	Airborne geophysical mapping completed Ground-truth geological mapping completed
Richardson District	137 sq. miles	Airborne geophysical mapping completed Partial geological map available
Rampart/Manley-Tofty	1017 sq. miles	Airborne geophysical mapping completed Ground-truth geological mapping completed

Upper Chulitna District	364 sq. miles	Airborne geophysical mapping completed Ground-truth geological mapping completed FY99; Final summary/synthesis map completed FY01
Petersville-Collinsville District	415 sq. miles	Airborne geophysical mapping completed Ground-truth geological mapping completed
Iron Creek District	689 sq. miles	Airborne geophysical mapping completed Ground-truth geological mapping initiated
Ruby District	591 sq. miles	Airborne geophysical mapping completed Geological map completed
Fortymile District	1036 sq. miles	Airborne geophysical mapping completed Ground-truth geologic mapping in progress (third year of three year program); preliminary geological maps released FY00 and FY01; final geologic map to be released spring FY02
Livengood District	229 sq. miles	Airborne geophysical mapping completed Geological map available
Salcha River/North Pogo District	1032 sq. miles	Airborne geophysical mapping completed Reconnaissance field orientation completed. Ground-truth geologic mapping in progress (first year of three year program). Preliminary reconnaissance map and geochemical data released FY01; preliminary geologic map to be released spring FY02.
Broad Pass area, Western Bonnifield District, and Southeast Pogo area	671 sq miles	Airborne geophysical mapping in progress (will be completed in FY02)